

IN THE CLAIMS:

Please cancel claim 13 and amend the claims as follows. Marked-up versions of the amended claims are attached.

3. (Amended) An electrically driven power steering apparatus according to claim 2, wherein a displacement limiter for limiting a predetermined or larger quantity of deformation of said elastic member is provided and constructed of a recessed portion formed in one of said rotor of said motor and said ball screw nut and a protruded portion formed on the other, and

said protruded portion, when said elastic member deforms by the predetermined quantity, engages with said recessed portion.

7. (Amended) An electrically driven power steering apparatus according to claim 1 or 4, wherein said rotor of said motor and said ball screw nut are connected by an engagement between a female spline and a male spline of which at least one toothed surface is coated with a resin.

8. (Twice Amended) An electrically driven power steering apparatus according to claims 3 or 6, wherein said displacement limiter limits the predetermined or larger quantity of deformation of said elastic member at 40% or smaller of a maximum steering force exhibited by said motor.

9. (Twice Amended) An electrically driven power steering apparatus according to claims 1 or 4, wherein a natural oscillation frequency of a system constructed of said rotor, said ball screw nut and said elastic member is set to 7 Hz or higher.

REMARKS

Applicants note that the first named inventor was not named on the official Notification of Missing Requirements received from the Patent Office, and requests that all future correspondence relating to this application reflect "Toshihiro Fukuda *et al*" as the first named inventor. Also, Applicants note that the attorney docket number for this case was not printed on the Notification of Missing Requirements. Applicants respectfully request that the

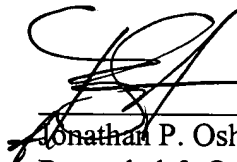
appropriate attorney docket number "10122.005001" be printed on all future correspondence for this case.

The specification has been amended to correct minor typographical errors. Figure 6 has been amended to correct an errant lead line. The claims have been amended solely to change dependencies. These amendments are fully supported by the original specification. No new matter has been entered by these amendments. The claims amendments are not made in view of prior art.

Early favorable action in the form of a Notice of Allowance is respectfully requested. If any issues arise in connection with this amendment, do not hesitate to contact the undersigned at the telephone number listed below. Please apply any charges not covered, or any credits, to Deposit Account 50-0591 (Reference Number 10122.005001).

Respectfully submitted,

Date: 9/12/02

 #45,079
Jonathan P. Osha, Reg. No. 33,986
Rosenthal & Osha L.L.P.
One Houston Center, Suite 2800
1221 McKinney Street
Houston, TX 77010

Telephone: (713) 228-8600
Facsimile: (713) 228-8778

Marked-Up Version of the Specification and Claims

IN THE SPECIFICATION:

In the paragraph beginning on page 2, line 20:

[On the other hand, there arises a problem of figuring out what mode a backlash of balls in the rolling path formed between the ball screw nut and the ball screw shaft should be adjusted.]

In the paragraph beginning on page 8, line 7:

[The presser member is screwed to the ball screw nut and thus adjusts a backlash of the balls within the ball screw nut. Hence, there is no necessity of providing a backlash removing means separately, and the electrically driven power steering apparatus can be provided at a low cost.]

In the paragraph beginning on page 11, line 20:

FIG. 2 is a sectional view taken in an axial direction, showing the periphery of the rack shaft coaxial type brushless motor in the first embodiment. The housing, i.e., the rack housing 8 is fixed to an unillustrated car body through a bracket (not shown) [21]. The rack shaft 22 is inserted through within the rack housing 8 and connected at its two side ends to tie rods 9 (FIG. 1), 10. The tie rods 9, 10 are connected to an unillustrated steering mechanism.

In the paragraph beginning on page 12, line 1:

A stator 23b taking a shape of circular tube is fixed within the rack housing 8, and a coil 23a constructed of a plurality of segments wound on a part of the stator 23b, is also provided therein. A rotor 23c taking a shape of long and thin circular tube is so provided as to insert into the stator 23b. A cylindrical magnet 23d for driving is provided facing to the stator [23a] 23b on an outer periphery of the rotor 23c. The drive magnet 23d is magnetized to for forming N- and S-poles alternately in the circumferential direction. The rack shaft 22 extends within the rotor 23c. Note that the stator 23b, the coil 23a, the rotor 23c and the drive magnet 23d constitute the brushless type electric motor 23.

In the paragraph beginning on page 15, line 24:

[On the other hand, according to this embodiment, a backlash of the ball 30 within the rolling path in the ball screw nut 29 is easily adjusted. For instance, after incorporating the ball bearing 25 into the ball screw nut 29, the presser member 31 is screwed to the side end of the ball screw nut 29, and the presser member 31 is rotated by an unillustrated tool till a proper pre-load is given.]

In the paragraph beginning on page 16, line 4:

[When the proper pre-load is given, the thin cylindrical portion 31b of the presser member 31 is caulked (C) in the radial direction. The presser member 31 is thereby so connected as to be impossible of the relative rotation with respect to the ball screw nut 29, whereby the ball 30 with the backlash can be stably retained within the ball screw nut 29.]

In the paragraph beginning on page 16, line 19:

In this modified example, after a proper pre-load is given by rotating the presser member 131, the holes 131a, 129a are filled with a molten resin 132. When the resin 132 defined as a hindering means is solidified, it follows that the presser member 131 is fixed to the ball screw nut 129 and does not slacken by dint of its shearing force and frictional force even when the strong force is transferred from the rack shaft 22, [whereby the ball 30 with the backlash can be stably retained within the ball screw nut 129.]

In the paragraph beginning on page 17, line 1:

Note that if desiring a decomposition of the ball bearing 25, the resin 132 is sheared when the presser member 131 is rotated by a strong force, and therefore the presser member 131 and the ball bearing 25 can be removed from the ball screw nut 129. When reassembling the components, the resin 132 is removed from the holes 129a, [139a] 131a, and the components may be assembled in the same steps.

In the paragraph beginning on page 17, line 8:

FIG. 6 is a sectional view taken in an axial direction, showing the periphery of the rack shaft coaxial type brushless motor in the electrically driven power steering apparatus in a second embodiment. Only a difference in the second embodiment is a configuration of the periphery of the ball screw nut. Therefore, the discussion will be focused on this configuration, and the same components as those in the first embodiment are marked with the same numerals of which the explanations are omitted. A rack housing 208 constructed of a small-diameter portion 208a and a large-diameter portion 208b is fixed to the unillustrated car body with an unillustrated bracket. The rack shaft 22 is inserted into the large-diameter portion [208a] 208b of the rack housing 208 and connected at its two side ends to tie rods 9 (FIG. 1), 10. The tie rods 9, 10 are connected to an unillustrated steering mechanism.

In the paragraph beginning on page 19, line 3:

A couple of flanged cylindrical core metals 252a, 252b each assuming an L-shape in section on one side are disposed in a way of coming into contact with the both side ends of the outer ring 251a of the bearing 251. A ring-shaped elastic member 235a is disposed between the left-sided core metal 252a and a spacer fitted to the small-diameter portion 208a. On the other hand, a ring-shaped elastic member 235b is disposed between the [right-sided] left-sided core metal 252b and a nut 233 screwed to the small0diameter portion 208a.

In the paragraph beginning on page 19, line 27:

According to this embodiment, if a large impact is exerted on the rack shaft 22 serving as the ball screw shaft such as an impingement upon the steering stopper and so on, the ball screw nut [129] 229 is permitted to move together with the bearing 251 in the axial direction while being supported by the slide bush 231. In such a case, however, in addition to the above-described effect of the resin coating over the spline teeth, the elastic members 235a, 235b can effectively absorb the impact and restrain the emission of the butting noises.

In the paragraph beginning on page 20, line 18:

FIG. 7 is a sectional view taken in an axial direction, showing the periphery of the rack shaft coaxial type brushless motor in the electrically driven power steering apparatus in a third embodiment. A rack housing 208 constructed of a small-diameter portion 308a and a large-diameter portion 308b is fixed to the unillustrated car body with a bracket 321 formed integrally with the small-diameter portion 308a. A rack shaft 322 is inserted into the large-diameter portion [308a] 308b of the rack housing 308 and connected at its two side ends to tie rods 9 (FIG. 1), 10. The tie rods 9, 10 are connected to an unillustrated steering mechanism. Note that the rack shaft 22 constitutes a ball screw shaft.

In the paragraph beginning on page 23, line 2:

A cylindrical member 331 having an inward flange 331a is screwed to a left side end of the small-diameter portion 308a of the rack housing 308. A bellow-shaped dust-proof boot 332 connects an outer periphery of the cylindrical member 331 to an outer periphery of the tie rod 10. A rack stroke damper 333, which is composed of a rubber or resin and has a groove formed in its outer periphery to get easy to deform, is fitted facing to the flange 331a inwardly of the cylindrical member 331 by use of a presser plate 334 taking substantially an L-shape in section. Even if the rack shaft 322 energetically displaces and a swollen side end 322b of the rack shaft 322 impinges upon the presser plate 334, the impingement of the side end 322b is damped by the rack stroke damper 333 disposed on the underside of the presser plate 334, thereby making it possible to prevent damages to the ball screw nut 329, the rack shaft 322 and the bearings 325, 328.

In the paragraph beginning on page 27, line 26:

FIG. 10 is a sectional view taken in an axial direction, showing the periphery of the rack shaft coaxial type brushless motor in the electrically driven power steering apparatus in a fourth embodiment. Only a difference in the fourth embodiment is a configuration of the periphery of the ball screw nut. Therefore, the discussion will be focused on this configuration, and the same components as those in the first embodiment are marked with the same numerals of which the explanations are omitted. A rack housing 408 constructed of a small-diameter portion

408a and a large-diameter portion 408b is fixed to the unillustrated car body with an unillustrated bracket. The rack shaft 322 is inserted into the large-diameter portion [408a] 408b of the rack housing 408 and connected at its two side ends to tie rods 9 (FIG. 1), 10. The tie rods 9, 10 are connected to an unillustrated steering mechanism.

In the paragraph beginning on page 32, line 8:

FIG. 11 is a sectional view taken in an axial direction, showing the periphery of the rack shaft coaxial type brushless motor in the electrically driven power steering apparatus in a fifth embodiment. Only a difference in the fourth embodiment is a configuration of the periphery of the ball screw nut. Therefore, the discussion will be focused on this configuration, and the same components as those in the first embodiment are marked with the same numerals of which the explanations are omitted. A rack housing 508 constructed of a small-diameter portion 508a and a large-diameter portion 508b is fixed to the unillustrated car body with an unillustrated bracket. The rack shaft 322 is inserted into the large-diameter portion [508a] 508b of the rack housing 508 and connected at its two side ends to tie rods 9 (FIG. 1), 10. The tie rods 9, 10 are connected to an unillustrated steering mechanism.

In the paragraph beginning on page 33, line 17:

A bearing 551 for rotatably supporting the ball screw nut 529 is disposed on an inner periphery [f] of the small-diameter portion 508a of the rack housing 508 through a thin cylindrical slide bush 531. The bearing 551 is constructed of an outer ring [552a] 551a, a couple of inner rings 551b, 551c and two trains of balls 551d disposed between the two rings.